DOCUMENT RESUME

ED 130 780 PS 008 913

AUTHOR Higgins, E. Tory; And Others
TITLE The Effect of Categorical Relatedness on Young Children's Object-Naming.
PUB DATE Apr 75
NOTE 18p.; Paper presented at the biennial meeting of the Society for Research in Child Development (Denver, Colorado, April 10-13, 1975)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Classification; *Cognitive Development; *Cognitive Processes; *Early Childhood Education; Kindergarten Children; Memory; Neurological Organization; Preschool Children; Reaction Time; Recall (Psychological); Taxonomy; *Verbal Learning

ABSTRACT

Naming tasks were used in two studies to test for conceptual organization in young children by comparing the latencies for naming objects in primed vs. non-primed conditions. In the primed condition, a taxonomic category was primed by prior activation of a coordinate member of the same category. In Study 1, 54 kindergarten children were randomly assigned to a primed or non-primed condition. All subjects had to name as quickly as possible each of a series of five toy objects. Each of the first four was from a distinctly different semantic category. In the primed condition the fifth object was a member of the same taxonomic category as the fourth object. In the non-primed condition the fifth object was of a different semantic category from all the preceding objects. Results indicated that the mean latency was greater in the primed than in the non-primed condition. Study 2 attempted to replicate Study 1 using a within subjects design and a stronger priming manipulation to increase the strength of the effect. Subjects were 16 preschool and 2 kindergarten children. In the primed condition the fifth object in each series was from the same semantic category as the preceding two objects. All objects were from different categories in the non-primed condition. In both conditions a sixth object was added that was always from a different category than the fifth object. Again, the results indicated greater latencies for the primed condition. Three explanations of this hindrance effect are discussed: (1) a false set explanation, (2) a categorization decrement effect; and (3) a naming interference explanation. (Author/SB)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED130780

9176

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

The Effect of Categorical Relatedness on Young Children's Object-Naming

E. Tory Higgins and James McGarry
Princeton University
Janellen Huttenlocher
University of Chicago

Paper presented at meetings of the Society for Research in Child Development, Denver, 1975.

PS008913

E. Tory Higgins
Department of Psychology
Green Hall
Princeton University
Princeton, New Jersey 08540

THE EFFECT OF CATEGORICAL RELATEDNESS ON YOUNG CHILDREN'S OBJECT-NAMING

E. Tory Higgins and James McGarry
Princeton University
Janellen Huttenlocher
University of Chicago

An issue in cognitive development which has attracted increasing attention is the nature of conceptual organization in young children. An important aspect of this issue is whether young children's stored conceptual knowledge is organized in terms of categorical relatedness; for example, is the young child's conceptual knowledge of object-classes organized in terms of taxonomic membership (e.g., 'furniture', 'animals')? Although it has been suggested that young children's conceptual knowledge is not organized in terms of categorical relatedness (e.g., Entwisle, Forsyth, & Muuss, 1964), Huttenlocher and Lui's (Note 1) recent review of the literature points out that studies using different measures of categorical relatedness--verbal free association (e.g., Entwisle et al., 1964; Francis, 1972); sorting or grouping words or objects (e.g., Bruner & Olver, 1963; Schaffer, Lewis, of Van Decar, 1971); free recall (e.g., Goldberg, Perlmutter, & Myers, 1974; Huttenlocher & Newcombe, in press; Lange, 1973); "release from proactive inhibition" (e.g., Hoemann, DeRosa, & Andrews, 1974; Huttenlocher & Lui; Note 1)--have had conflicting results. In fact, there has even been disagreement among studies using the same basic measure of conceptual relatedness.

Nevertheless, there are some studies which clearly indicate that pre-schoolers distinguish objects and object names in terms of taxonomic membership, and spontaneously access stored information concerning taxonomic membership (e.g., Goldberg et al., 1974; Hoemann et al., 1974; Huttenlocher & Lui, Note 1; Huttenlocher & Newcombe, in press). However, it is not clear from these studies whether conceptual information concerning object-classes is necessarily organized by taxonomic categories for pre-schoolers, as there are a number of possible explanations for the findings which do not require that concepts sharing taxonomic membership be organized together (cf. Huttenlocher & Lui, Note 1; Huttenlocher & Newcombe, in press). The only requirement is that information concerning the taxonomic membership of each concept be stored. Such information could be available because concepts sharing taxonomic membership are stored together. However, it could also be available because the taxonomic membership of each concept is stored with the concept, with the concepts themselves not being organized in any particular way.

Posner & Warren (1972) have suggested that to determine the nature of memory structure it may not be appropriate to use tasks where conscious search strategies could be involved. Posner & Warren prefer to define memory structure in terms of one stored item activating or priming another in a rather direct and simple way, even when a subject does not intend for this to occur (see also Collins & Quillian, 1970). Posner & Warren call such processes "automatic," as distinct from those that involve more conscious strategies. By testing for "automatic" processes they

feel that one may better ask what kinds of memory structure subjects have in mind before they are asked to make a classification. Thus using a task with young children that involves more automatic processes might provide clearer results concerning conceptual organization. In the present study a "naming" task is used to test for conceptual organization in young children in which the latencies for naming objects in "primed" versus "non-primed" conditions are compared (where a taxonomic category is "primed" by prior activation of a coordinate member of the same category).

There were three purposes of our study: (1) to obtain converging evidence from a different task that young children's conceptual knowledge of object-classes does include information concerning categorical relatedness; (2) to test, using a procedure involving more "automatic" processes, whether there is conceptual organization of taxonomic categories in young children's long-term memory; (3) to examine the effects of such conceptual organization, if present, on the verbal encoding processes reflected in naming behavior.

STUDY 1

Method

Subjects. The subjects were 54 kindergartners (33 males and 21 females) ranging in age from 5,1 to 5,11, with a median age of 5,7. All subjects were native speakers of standard English.

Design. Subjects were randomly assigned to either a 'Primed' condition or a 'Non-Primed' condition. All subjects had to name as quickly as possible each object in a series of 5 toy objects presented to them. Each of the first four objects in the series

was from a distinctly different semantic category. In the 'Primed' condition the fifth object was a member of the same taxonomic category as the fourth object. In the 'Non-Primed' condition the fifth object was a member of a different semantic category from all the preceding objects.

Procedure. The first two objects were the same for all subjects--a toy ball followed by a toy tree. These two "practice" items were included because a pilot study indicated that there was a significant order effect on naming latencies for the first two objects in the series. The taxonomic categories examined in this study were 'furniture,' 'vehicles,' and 'animals,' with the third, fourth, and fifth toy objects in the series being selected from these categories. There were three exemplars of each category: 'furniture'--bed, table, chair; 'vehicles'--car, boat, train; and 'animals'--horse, dog, cow. The Lorge-Thorndike J count (Thorndike & Lorge, 1944) and Rinsland's vocabulary frequency count for first graders (Rinsland, 1945) were consulted in order to insure that the names of all objects selected would be in the active vocabulary of the children, and to control for word frequency across categories.

For both the 'Primed' and 'Non-Primed' conditions, 9 different object series were constructed such that each of the three exemplars from each of the three categories appeared in final position in one of the series. In the 'Primed' condition each exemplar of each category appeared as the priming object in fourth position. In the 'Non-Primed' condition each exemplar of each category appeared as the non-priming object in fourth position.

Each subject sat in front of a large wooden box (12" x 12" x 12"). The box had aluminum sliding doors that opened to reveal a space of 6" x 8" through which the toy objects could easily be seen. The experimenter then explained the game as follows:

> Here is a box and I have some toys that I'm going to put in the box. Now when the doors here open (E points to doors), I want you to tell me as quickly as you can what the toy is. You see? It's a "Name" game, and remember you have to name the toy as fast as you can. O.K., let's play the game and see how it goes. Look here (E points to doors)! Ready? (Doors open)

A toy object could be placed in the box through its open back without the toy being seen by the child. The sliding doors were opened mechanically by the experimenter pushing a lever arm. The instant the doors opened at all, an electronic centisecond timer was activated. The experimenter stopped the timer by pressing a button when the subject named the object. To prevent possible experimenter bias, a research assistant "blind" to the purpose of the study operated the box and timer. The reaction time for opening the doors and shutting off the timer ranged from 13 to 17 centiseconds, with a median of 15 centiseconds.

Results

Table 1 shows the mean latencies for each of the objects in fifth position for the 'Primed' and 'Non-Primed' conditions. There were almost no errors in naming the objects. For 7 of the 9 objects

---

Insert Table 1 about here

---

the mean latency was greater in the 'Primed' than in the 'Non-Primed' condition (Binomial probability, $p > .10$ two-tailed). This difference between the two conditions was in the same direction as that found in a previous study involving younger children and a somewhat different design (McGarry, Note 2). However, this difference was not significant in either study. The purpose of Study 2 was to replicate Study 1 using a within-subject design and a stronger priming manipulation to increase the strength of the effect.

STUDY 2

Method

Subjects. The subjects were 16 pre-schoolers (9 females, 7 males), and 2 kindergartners (2 females) ranging in age from 4, 0, to 5, 11 with a median age of 5, 1. All subjects were native speakers of standard English.

Procedure. The design of the study was very similar to Study 1. In study 2 the fifth object in each series could be from the same semantic category as both immediately preceding objects (the 'Primed' condition), or could be from a different category than all the preceding objects (the 'Non-Primed' condition). In addition, there was a sixth object which was always from a different category than the fifth object. Each subject was given both a 'Primed' and 'Non-Primed' series, with the order of these two conditions alternating among subjects.

For each subject, the 'Primed' and 'Non-Primed' series they received contained the same fifth and sixth objects. Table 2 shows some of the different pairs of 'Primed' and 'Non-Primed'

object series that were used. The pairs of 'Primed' and 'Non-Primed' object series were constructed such that each of the three

---

Insert Table 2 about here

---

exemplars of 'furniture,' 'vehicles,' and 'animals,' appeared in fifth position and sixth position in one of the series. In every series the second object was a toy tree. In every Priming series the first object was a toy ball, and in every Non-Priming series the first object was a toy shoe. The purpose of this object selection was to impress upon subjects at the beginning of the second series that some objects may be the same as those in the first series while others may be different. There was a period of approximately thirty minutes between the presentations of the first and second series. During this period subjects participated in another unrelated study. The procedure for the "Name" game was the same as in Study 1.

Results

Table 1 shows the mean latencies for each of the objects in fifth position for the 'Primed' and 'Non-Primed' conditions. It is evident from Table 1 that Study 2 replicated Study 1. For 7 of the 9 objects the mean latency was again greater in the 'Primed' than in the 'Non-Primed' condition. In addition, the five largest differences were all in this direction. For the statistical comparison, the scores of the two subjects tested on the same pair of 'Primed' and 'Non-Primed' object series (but in reverse orders) were averaged together. This within-subject

analysis indicated that the mean latencies for naming the objects in fifth position were significantly greater in the 'Primed' than the 'Non-Primed' condition (Wilcoxon $\underline{T} = 5$; $\underline{N} = 9$; $\underline{p} < .05$ two-tailed). In contrast, there was very little difference between the 'Primed' and 'Non-Primed' conditions in mean latencies for naming the objects in sixth position ($\underline{T} = 22.5$; $\underline{N} = 9$; $\underline{p} > .15$ two-tailed). As in Study 1, there were almost no naming errors.

General Discussion and Conclusions

Study 1 and Study 2 (and our previous study) had the same basic result--children between four and five years-of-age were slower to name a toy object when it was immediately preceded by the naming of one or two other toy objects from the same taxonomic category as compared to toy objects from different taxonomic categories. Before discussion the implications of these findings, some further aspects of the results need to be considered.

In Study 1 the only two toy objects which did not show the "priming" effect were the boat and the train. In Study 2 the only two objects which did not show the "priming" effect were the boat and the car. Thus in both Studies 1 and 2 the objects which did not show the effect were "vehicles." In both Wepman & Hass' (1969) oral vocabulary count for five-year-olds, and Rinsland's (1945) written vocabulary count for first graders, the words "vehicle" or "transportation" do not appear, whereas the words "animal" and "furniture" do. This suggests that for young children the taxonomic category of 'vehicle' is not as familiar as are the taxonomic categories of 'animal' and 'furniture' which might explain why there was less evidence of the priming effect

for members of the 'vehicle' taxonomic category. Among the toy vehicles, the toy boat was the only one to not show the "priming" effect in either Study 1 or Study 2. The boat is also the only vehicle used in the studies whose definition in the dictionary does not mention that it is a vehicle. If a boat is not always considered a member of the vehicle category, especially by young children, this might explain the consistent absence of the priming effect for the boat.

The results from Studies 1 and 2 suggest that the naming response of children was hindered in the 'Primed' condition. How might this hindrance effect be explained? We will discuss three possibilities: (1) a "false set" explanation; (2) a "categorization decrement" explanation; and (3) a "naming interference" explanation.

In Study 1 children in the 'Primed' condition may have been surprised when the fifth object was from the same taxonomic category as the fourth object, as prior to the fifth object all the objects were consistently from different taxonomic categories. The children's false set may have caused a slight hesitation in their naming response. However, in Study 2 the fifth object in the 'Primed' condition was from the same taxonomic category as both preceding objects which is as likely to have caused an expectation for the same category on the fifth trial as for a different category. Furthermore, the sixth object in the 'Primed' condition was from a different category than all three previous objects which should have surprised the children. However, there was no evidence of a "false set" effect for the sixth object.

The results, therefore, do not support a "false set" interpretation.

Another possible explanation for the slower naming latencies in the 'Primed' condition is that an object from the same taxonomic category as the immediately preceding object(s) may not be as salient or distinct as one from a new taxonomic category. Being less distinct, the object is slower to be correctly categorized which causes an increase in response latency. This "categorization decrement" explanation cannot be adequately ruled out in the present studies. However, we are presently conducting a series of studies (in collaboration with Lorraine Stepnesky) that control for the effects on categorization of variation in perceptual context and variation in the perceptual similarity of stimuli within and between taxonomic categories. These studies also examine the effects on naming of varying subjects' expectations and varying the time interval between the presentation of items.

Both the "false set" and "categorization decrement" explanations require that young children's long-term memory contain information concerning the taxonomic membership of object-classes. They do not, however, require that conceptual information for object-classes from the same taxonomic category be organized together in long-term memory. The alternative "naming interference" explanation does involve this assumption. When a child is presented with an object and names it (e.g., horse), the stored conceptual information for that object-class is activated. As information for other object-classes (e.g., 'sheep,' 'cow,' 'cat,' etc.) from the same taxonomic category (i.e.,

'animal') are stored closely with this object-class, its activation will also prime or activate them to some extent. The child is then presented with another member of the same taxonomic category (e.g., dog) which activates the conceptual information for that object-class and, to some extent, the conceptual information for closely related object-classes. The child's task is to retrieve and produce the name for the particular object-class presented. However, closely related object-classes (and perhaps their names as well) have also recently been activated. According to a "naming interference" explanation, it is the extra care required because of interference at the conceptual and/or naming levels that increases the naming latencies in the 'Primed' condition.

In the present study, activating one member of a taxonomic category hindered the verbal encoding of other members of the taxonomic category. However, it rarely led to errors. In natural communication situations verbal encoding errors are also rare. The verbal encoding errors referred to as slips of the tongue (cf. Fromkin, 1971; Hotopf, Note 3) often involve encoding the correct taxonomic category but the wrong instance of the category (e.g., 'uncle' for 'brother,' 'lunch' for 'supper'). An interesting question, with important implications for communication, is when does linguistic and extralinguistic activation of organized stored information facilitate communication, and when does it hinder communication. Furthermore, do the conditions that facilitate or hinder communication vary as a function of age?

Reference Notes

1. Huttenlocher, J., & Lui, F. The organization of some simple nouns and verbs. Unpublished manuscript.

2. McGarry, J. Priming and prior context: Evidence of long-term organization into semantic categories in pre-schoolers and kindergartners. Senior Thesis, Princeton University, 1974.

3. Hotopf, W. H. N. Unintentional errors in speech and writing as clues to processes underlying word production. Unpublished report. Social Psychology Department, London School of Economics and Political Science.

References

Bruner, J. & Olver, R. Development of equivalence transformations in children. Monograph of the Society for Research in Child Development, 1963, 28, 125-143.

Collins, A. M. & Quillian, M. R. Facilitating retrieval from semantic memory: The effect of repeating part of an inference. Acta Psychologica, 1970, 33, 304-314.

Entwisle, D. R., Forsyth, D. F., Muuss, R. The syntactic-paradigmatic shift in children's word associations, Journal of Verbal Learning and Verbal Behavior, 1964, 3, 19-29.

Francis, H. Toward an explanation of the syntagmatic-paradigmatic shift, Child Development, 1972, 43, 949-958.

Fromkin, V. A. The non-anomalous nature of anomalous utterances. Language, 1971, 47, 27-52.

Goldberg, S., Perlmutter, M., & Myers, N. Recall of related and unrelated lists by 2-year-olds. Journal of Experimental Child Psychology, 1974, 18, 1-8.

Hoemann, H. W., DeRosa, D. V., & Andrews, C. E. Categorical encoding in short-term memory by 4- to 11-year old children. The Bulletin of the Psychonomic Society, 1974, 3, 63-65.

Huttenlocher, J., & Newcombe, N. Semantic effects on ordered recall. Journal of Verbal Learning and Verbal Behavior. In press, 1976.

Lange, G. The development of conceptual and role recall skills among school age children. Journal of Experimental Child Psychology, 1973, 15, 394-406.

Posner, M. I., Warren, R. E. Traces, concepts, and conscious constructions. A. W. Melton & E. Martin (Eds.) Coding processes in human memory. Washington, D.C.: V. H. Winston & Sons, 1972.

Rinsland, H. D. A basic vocabulary of elementary school children. New York: MacMillan, 1945

Schaffer, B., Lewis, J., & Van Decar, A. The growth of children's semantic memory: Semantic elements. Journal of Experimental Child Psychology, 1971, 11, 296-309.

Thorndike, E. L., & Lorge, I. Teacher's word book of 30,000 words. New York: Bureau of Publications, Teacher's College, Columbia University, 1944.

Wepman, J. M., & Hass, W. A spoken word count. Chicago: Language Research Associates, 1969.

Table 1

Mean Naming Latencies (in Seconds) for Toy Objects in Fifth Position for Primed and Non-Primed Conditions: Study 1 and Study 2

Toy Objects	Study 1		Study 2	
	Primed	Non-Primed	Primed	Non-Primed
Bed	1.65	1.32	1.33	1.28
Table	1.64	1.15	1.62	1.58
Chair	1.60	1.36	1.50	1.15
Car	1.15	1.02	1.22	1.25
Train	2.04	3.40	1.27	1.15
Boat	1.19	1.22	1.00	1.10
Horse	1.20	1.11	1.14	.97
Dog	1.29	1.16	1.48	1.22
Cow	1.86	1.25	1.95	1.29

Table 2

Exemplar Pairs of Primed and Non-Primed Object Series Used in Study 2

Object series pairs	Toy objects presented in each position					
	First	Second	Third	Fourth	Fifth	Sixth
1A	ball	tree	table	bed	chair	train
B	shoe	tree	car	cow	chair	train
2A	ball	tree	dog	horse	cow	bed
B	shoe	tree	chair	train	cow	bed
3A	ball	tree	boat	train	car	dog
B	shoe	tree	cow	bed	car	dog

A: Primed Condition

B: Non-Primed Condition